IDAHO DEPARTMENT OF FISH AND GAME

ANNUAL REPORT

HAYSPUR HATCHERY

1992

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INTRODUCTION

Hayspur Fish Hatchery is a license-funded "resident" broodstock and production facility. The hatchery maintains two captive broodstocks: rainbow trout Oncorhynchus mykiss designated R9 or Hayspur strain, and a Kamloop trout designated K1, derived from Skanes/Gloyd Springs stock. Eyed egg production for six resident hatcheries remains a priority since renovation in 1989. Catchables and fall fingerling are reared for stocking into the Big Wood River and Salmon River drainages.

The hatchery (elevation 4,880 ft) is located in Blaine County on Loving Creek, approximately 40 miles southeast of Sun Valley, Idaho. Fish culture apparatus consists of an incubation building, a hatchery building with 20 early-rearing tanks, 8 covered 24-foot diameter circular ponds, 6 small fingerling raceways, 6 large production raceways, and an earthen brood pond.

Water sources include the Hayspur Spring of 3 to 5.5 cfs at 52°F (11.6°C); pumped artesian wells producing 3.5 cfs, also at 52°F; and diverted Loving Creek water of 7.4 to 22 cfs at 33°F to 73°F (5.5°C to 22.7°C). A new well was drilled producing 46°F water with a 2 cfs water right. This well has not been pump tested to determine water flow at the time of writing this document.

Personnel include three permanent employees, Fish Hatchery Superintendent II, Fish Hatchery Superintendent I, and Fish Culturist; and 16.6 months of temporary Bio-Aide time. Usually three Bio-Aides help out during spawning season and one for the summer field season.

FISH PRODUCTION

Extremely low flows, temperatures in the 70s (°F), and fluctuating dissolved oxygen levels resulted in reductions in fish production. Catchables scheduled for redistribution were hauled out early to reduce biomass. The fingerling request was reduced from 250,000 to 100,000 fall fingerling to provide water for broodstock.

A total of 433,324 rainbow trout were produced. Catchable production totaled 229,569 fish weighing 73,117 pounds (Table 1). Hayspur stocked 111,180 catchable rainbow trout into Region 4 and Region 7 waters. These fish were stocked into the Big Wood, Little Wood, and upper Salmon River drainages. Catchable rainbow trout were transferred to Mullan, Clark Fork, and Sawtooth hatcheries (Table 2). Mullan Fish Hatchery received 35,370 catchables for redistribution in Region 1 waters. Clark Fork Fish Hatchery received 17,988 catchables, also for stocking Region 1 waters. Sawtooth Fish Hatchery was shipped 65,031 catchables for redistribution into the Salmon River and tributaries upstream of the Pahsimeroi River and Stanley Basin lakes.

Fall fingerling production totaled 112,345 fish weighing 7,928 pounds. Magic Reservoir was stocked with 97,345 fingerlings. These 4.0-inch to 4.5-inch fingerlings were adipose clipped for evaluation of fishery performance. Little Wood Reservoir was stocked with 15,000 of 4.4-inch to 4.8-inch fingerlings. These fish were marked with an adipose clip (Table 3). With the reservoir at the lowest level recorded, the fingerling were stocked via 300 feet of 8-inch irrigation pipe down a steep pitch of exposed lava rock. Land manager Terry Gregory provided the pipe, flatbed, and semi-truck.

Drought conditions canceled the request for Fish Creek Reservoir. Redfish Lake stocking was reduced and delayed due to ramifications of listing the Snake River sockeye Oncorhynchus nerka.

HATCHERY IMPROVEMENTS

Improvements to the hatchery were as follows:

1. Fabrication and calibration of a formalin injection system in the new incubation building.

2. Construction of a moist egg chiller to increase flexibility of eyed egg delivery timing.

3. Construction of a new set of crowd racks for the round ponds.

4. Reseeded the "rough" areas, planted willows, and installed goose nesting platforms on the Loving Creek rehabilitation area.

5. Drilled a new well for future additional circular ponds.

6. Rebuilt the information sign and constructed a campground host sign.

Needs of the hatchery listed in order of priority are:

1. Replace domestic water line and domestic pump/pressure tank.

2. Earthen brood pond needs to have sediment removed.

3. Roof of spring-house needs replacement.

4. Replace oldest hatchery residence.

FISH HEALTH

Specific pathogen-free broodstock replacement pairings totaled 151 pairs, or 302 individuals. Non-lethal ovarian fluid samples from females and lethal spleen, kidney, and pyloric caeca samples from males were tested by the Eagle Fish Health Lab. One male (#20) was found to be positive for Infectious Pancreatic Necrosis (IPN). This finding represents the only positive adult out of 1,112 sampled since 1987. Three females (#14, #10, and #15) were found to be positive for Bacterial Kidney Disease (BKD) by the FAT technique. Twenty-two males were found to be positive for BKD by the ELISA technique (Table 4). The progeny from pairings of the IPN positive male and the FAT positive females were excluded from the broodstock replacement population as per the broodstock management plan. A summary of BKD monitoring by FAT and ELISA techniques on earthen pond adults suggests the incidence of detection was 8.2%. This represents a reduction in incidence of detection of 46.5%. Should a non-lethal method (serum) be developed, the criteria for elimination from the future broodstock population may include any ELISA positive.

Coldwater Disease Flexibacter psychrophilus remains the most serious pathogen in production fish. Catchables reared in Loving Creek water were fed Terramycin with an encouraging reduction in winter mortality. Production fish reared in Loving Creek tested negative for Whirling Disease and IPN for the fourth consecutive season.

HAYSPUR

FISH SPAWNING

Spawning season at Hayspur has become an 8-month project with an egg take of 13.9 million eggs during the period covered. Photoperiod manipulation and a moist egg chiller has expanded the "normal" spawn timing to better meet the requests of six resident hatcheries. Hagerman, Nampa, Grace, American Falls, Ashton, and Hayspur were recipients of eyed eggs from the various populations at Hayspur. Five additional hatcheries were shipped eggs for time frame and austerity considerations. Cabinet Gorge and Sandpoint hatcheries were shipped eyed eggs for delayed development rearing. These eggs will be shipped to Hagerman as fry to meet a request after the period covered by this report. Sawtooth was shipped green eggs. Sawtooth incubated these eggs to the eyed stage, then Hayspur personnel shipped them to Grace. Clark Fork requested eggs for trial rearing. McCall Hatchery was shipped the very last eggs available when contract eggs for the mountain lake program became unavailable. A total of 8.1 million eggs were shipped from Hayspur (Table 5). Henrys Lake Hatchery was shipped Kamloop sperm from light control Kamloops to produce hybrids.

The spawning populations include: 1) Hayspur strain rainbow (R9) in the earthen pond population of 2,000+ adults of various year classes. This population could be considered the founding population. The earthen pond population is the source of adults for the one female by one male matings which are evaluated by the Eagle Fish Health Lab. Families with specific pathogen-free status will contribute progeny to the broodstock replacement population. A total of 1,255,537 eyed eggs were produced from the earthen pond broodstock. Hagerman and Hayspur raise the resultant fish. 2) Specific pathogen-free Hayspur rainbow (R9) are contained in the covered circular ponds. These fish are adults from one on one pairings, reared at Nampa, and returned to Hayspur as 2 year olds. The fish are segregated by year class. During the year, 5, 4, 3, and 2 year old fish were spawned. The majority of egg production or 7,937,342 eyed eggs were generated by this population (Table 6). Three ponds of six were on photoperiod manipulation to produce eggs in January through March of 1993. 3) Skanes or Gloyd Springs Kamloop (K1) were contained in two of the covered circular ponds. These fish were 4 years old during the period covered. A total of 1,034,363 eyed eggs were taken from this population (Table 7). One pond was on photoperiod manipulation to produce eggs in January through March of 1993.

Some spawning season parameters are summarized below:

R9
FECUNDITY

Aqe	1989	1990	1991	1992
2 year old	2,54	2,467	2,525	3,344
3 year old		3,190	3,104	3,361
4 year old			3,705	4,065 *

* 4 and 5 year old

R9
EYE-PERCENTAGE

Age	1989	1990	1991	1992
2 year old	82.8	86.3	83.6	78.1
3 year old		80.8	84.8	72.2
4 year old			66.3	70.7*

* 4 and 5 year old

FISH FEED

An attempt to feed a low phosphorous Bio-Diet ration was started only to be aborted due to low flows and early transfers of catchables to reduce biomass. Broodstock were fed Rangen's 1/4-inch pellet with 150 grams per ton canthaxathin (Table 8).

PUBLIC RELATIONS

Tours were entertained for area schools, including Bellevue Elementary, Hailey Elementary, Hailey Junior High, Hemingway School (Ketchum), Cornerstone Academy (Ketchum), and CSI aquaculture students. Organized groups, such as Flyfishers of Idaho, Good Sam RV Club of Jerome, Boy Scouts, and the Nature Conservancy, were also given tours.

Approximately 7,000 folks visited the hatchery, stayed at the campground, and/or fished Gaver Lagoon or Loving Creek on hatchery property. A national level field trial event for retrievers was held during the summer. Gaver Lagoon continues as a popular fishery for a variety of anglers, including kids and the physically challenged.

Hayspur personnel assisted regional fishery staff with electrofishing surveys on the Big Wood River, a response to a fish kill on Silver Creek, gillnetting Baker Lake, big game and upland bird check stations, and spawning at Henrys Lake. Personnel joined in a search and rescue effort to find the late Frank Gift.

Hayspur enjoyed the dedicated efforts of a Camp Host. George and Pat Allen volunteered time to answer questions, give directions, clean up litter in the campground and around Gaver Lagoon, kept the restrooms tidy, and generally presented an excellent image for the Department.

Hatchery personnel gave presentations to Sun Valley and Hailey Rotary Clubs. The Times News, the Statesman, and Mountain Express carried articles on a wide range of topics, including spawning and light control, search and rescue efforts, and Silver Creek fish mortality and dissolved oxygen monitoring.

FIN QUALITY

A copy of a fin quality evaluation program was obtained from Ashton Fish Hatchery. A 20-fish sample from three of six large catchable raceways were measured. As per directions, fork length, right and left pectoral, and dorsal fin measurements were recorded. Fin ratio averages from these fish compared to wild fish fin ratios were as follows: raceway D = 0.59, raceway E = 0.51, and raceway F = 0.65. Although these fish appeared to have acceptable fins, the exercise demonstrated a need to improve fin quality. If the drought ends, we will try using a density index of .3 as an upper limit in an effort to improve fin quality.

SPECIAL PROJECTS

Golden Trout Trapping and Spawning Protect at Baker Lake

Hayspur personnel operate a golden trout Oncorhynchus aquabonita trapping and spawning project at Baker Lake. Baker Lake (elevation 8,796) is an alpine lake of 12 surface acres in the Upper Big Wood River drainage. The lake, located 30 miles northwest of Sun Valley, is reached via a 1 1/4-mile hike from a trailhead at the end of Baker Creek Road.

The trap was installed on the outlet of Baker Lake on May 26, 1992. Trapping operations ran until July 15, 1992. A total of 15 golden trout were obtained. Golden trout trapped included seven males and three females. The other eight fish were immature and sex was not determined. Trapping included 66 Henrys Lake cutthroat trout. One rainbow trout was trapped. No golden trout eggs were taken.

A gillnetting operation was run July 13 and July 14. This effort yielded 77 trout. Included were 6 golden trout, 57 cutthroat trout, 11 brown trout, and 5 rainbow trout. Trapping and netting removed 146 undesirable fish from the lake. Although discouraging, the Department has no other viable alternative. It was decided to evaluate this program until 1994, including biomass removal of undesired species in 1993, and reevaluate.

On July 17, 1992, Baker Lake was stocked with 630 golden trout fingerlings of Montana stock. The fingerlings averaged 28 fish per pound. Golden trout were left ventral fin-clipped. They were stocked via helicopter and bambi bucket.

Loving Creek Rehabilitation Protect

During the period covered, two signs were installed by the Flyfishers of Idaho and Hayspur personnel. A work day involving the same folks, planted willow shoots, moved a goose nesting platform to an island, and reseeded some of the "rough" areas with a native grass/forb mix. A volunteer, John Miller, planted 20 water birch donated by the Nature Conservancy.

Anglers reported at least five fish over 20 inches from the new stream area. A number of "hatches" were observed. The public comments have been positive. Waterfowl have found the environment to their liking.

ACKNOWLEDGEMENTS

The efforts of Bio-Aides Kurt Stieglitz, John Miller, and Mike Paddock are to be commended. Kurt Stieglitz worked the Baker Lake project and the spawning season. John Miller worked the spawning season and went on to a position at Henrys Lake. Mike Paddock worked the spawning season. He contributed especially in the area of tracking incubation and treatment time frames.

Table 1. Hatchery cost production summary, 1992.

Fish size	Number of fish	Pounds of fish
Catchables	229,569	73,117
Fingerlings	203,755	5,297
Totals	433,324	78,414

Total hatchery operation costs:	$174,400.00
Hatchery cost per fish:	$0.402
Hatchery cost per pound:	$2.22

HSPRTABS

Table 2. Fish transfer summary, 1992.

Shipped from	Received	Average size	Number of fish
Nampa	Hayspur	20.0-21.5 inches	2,793
Hayspur	Nampa	4.1-4.5 inches*	5,000
Hayspur	Mullan	9.5-11.0 inches	35,370
Hayspur	Sawtooth	9.5-14.5 inches	65,031
Hayspur	Regions 4 and 7'	9.5-11.0 inches	111,180
Hayspur	Clark Fork	9.2-11.0 inches	17,988
Hayspur	Little Wood Reservoir[b]	4.4-4.8 inches	15,000
Hayspur	Magic Reservoir[b]	4.0-4.5 inches	97,345
Hayspur	Lake Walcott`	2.1-2.5 inches	91,410

[a] Annual outplants of catchables in Regions 4 and 7.
[b] Fall fingerling releases in Magic Reservoir.
[c] Spring release of excess fry.
* Fingerlings for Hayspur broodstock replacement in 1993.

HSPRTABS

Table 3. Marking data for Hayspur Hatchery fingerlings and catchables, 1992.

Year	Water	Number	Length (inches)	Mark/ clip
1992	Big Wood River[a]	4,095	9.5-11.0	AD clip
1992	Magic Reservoir	97,345	4.0-4.5	AD clip
1992	Little Wood Reservoir	15,000	4.4-4.8	AD clip
1992	Little Wood Reservoir	7,600	9.5-11.0	Left Max
Total		124,040		

[a] The section of the Big Wood River from Croy Creek to Broadford Bridge.

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Table 4. Fish Health Lab reports.

Brood year	Species	Sample date	VH	VP	BK	BF	BR	BC	PW	PC	Comments
1990	R9	1-28	-	-	+				-		
1992	R9	2-5									
1991	R9	2-28	-	-	-	-	-	-			
1991	R9	2-28	-	-	-	-	-	-			
1991	R9	2-28	-	-	-	-	-	-			
1991	R9	2-28	-	-	-	-	-	-			
1991	R9	2-28									
1991	R9	2-28									
1990	R9	4-3	-	-		-	-	-			
1992	R9	6-18	-	-	-	-	-	-			
1991	R9	6-18	-	-	-	-	-	-			
1991	R9	8-4				-	-	-			
1991	R9	8-4				-	-	+			
ADULT	R9	8-18									
BROOD	R9	10-14		+	-				-	-	MALE/#20 (ELISA)
BROOD	R9	10-14			+						
BROOD	K1	10-14			+						
BROOD	K1	10-14			+						
BROOD	R9	10-14			-						

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Table 4. Continued.

Brood year	Species	Sample date	VH	VP	BK	BF	BR	BC	PW	PC	Comments
BROOD	R9	10-14			+						
BROOD	R9	10-28	-	-	-						FEMALE/#14 (FAT)/LOW
BROOD	R9	11-10	-	-	+						(ELISA)2/40
BROOD	R9	11-25	-	-	+				+		FEMALE/#10,15 (ELISA)/MOD
BROOD	R9	12-11			+						(ELISA)/LOW

VH = IHNV, infectious hematopoietic necrosis virus
VP = IPNV, infectious pancreatic necrosis virus
BK = Bacterial Kidney Disease agent
BF = Bacterial Furunculosis
BR = Enteric Red Mouth Bacterium
BC = Bacterial Coldwater Disease
PW = Whirling Disease agent
PC = agent of Ceratomyxosis

HSPRTABS

Table 5. Egg shipment summary, 1992.

Hatchery	Species	Total eggs shipped
American Falls	R9	185,323
Ashton	R9	230,190
Cabinet Gorge	R9	1,438,767
Clark Fork	R9	266,001
Grace	R9	667,040
	Kl	180,747
Hagerman	R9	2,151,836
	K1	941,136
Hayspur	R9	1,024,790
McCall	R9 & K1	54,756
Nampa	R9	371,444
Sandpoint	R9	508,642
Sawtooth*	R9	169,182
Total		8,189,854

*Eggs shipped to Sawtooth were green eggs.

HSPRTABS

Table 6. Rainbow (R9) spawning summary.

Lot	Date	No. females	No. eggs	Average fecundity	Eyed eggs	Percent eye-up
SPFL3-50	1/1/92	64	201,823	3,153	159,756	79.1
SPFL3-51	1/13/92	44	135,610	3,082	124,007	91.4
SPFL3-52	1/22/92	26	107,406	4,131	DISCARDED	
SPFL3-53	1/23/92	29	71,063	2,450	52,670	81.1
SPFL3-54	1/30/92	17	47,664	2,803	42,664	89.5
SPFL3-55	2/12/92	15	34,010	2,267	22,700	66.7
SPFL3-56	2/20/92	8	26,172	3,271	16,257	62.1
SPFL3-57	3/6/92	6	17,697	2,949	13,201	74.6
SPF2-1	10/2/92	11	51,020	4,638	38,750	76.0
SPF4-2	10/6/92	10	41,633	4,163	20,733	49.8
SPFL2-3	10/8/92	89	402,370	4,521	217,870	54.1
SPFL2-4	10/9/92	93	364,887	3,924	292,307	80.1
SPF2-5a	10/10/92	24	90,642	3,762	86,207	95.1
REG 1	10/14/92	23	76,678	3,334	48,533	63.3
SPF4-5	10/15/92	12	37,047	3,087	17,798	47.5
SPFL2-6	10/16/92	43	123,418	2,870	69,364	56.2
SPFL2-7	10/16/92	48	180,215	3,754	131,465	73.0
SPF2-8	10/19/92	63	297,443	4,721	272,184	91.5
REG 2	10/21/92	19	62,914	3,311	46,917	74.6
SPF3-9	10/22/92	15	54,484	3,632	41,479	76.1
SPF4-10	10/22/92	14	67,551	4,825	58,315	86.3
SPFL2-11	10/23/92	34	137,705	4,050	119,848	87.0
SPFL2-12	10/23/92	57	217,581	3,817	146,153	67.2
SPF2-13	10/27/92	150	504,531	3,364	444,531	88.1
SPF4-14	10/27/92	18	62,553	3,475	51,366	82.1
REG 3	10/28/92	34	95,377	2,805	74,189	77.8
SPF3-15	10/29/92	29	95,132	3,280	75,814	79.7
SPFL2-16	10/30/92	34	138,119	4,062	121,452	87.9
SPFL2-17	10/30/92	25	96,984	3,879	81,034	83.5
SPF2-18	11/2/92	135	265,629	1,968	180,645	68.0
SPF3-19	11/4/92	21	81,300	3,871	62,729	77.2
REG 4	11/4/92	54	181,,267	3,357	158,866	87.6
SPF4-20	11/5/92	19	69,977	3,683	57,777	82.6
SPFL2-21	11/5/92	24	98,030	4,085	86,206	87.9
SPFL2-22	11/6/92	27	113,306	4,197	100,000	88.3
SPF2-23	11/9/92	89	381,451	4,286	325,000	85.2
REG 5	11/10/92	57	144,690	2,538	116,784	80.7
SPF3-24	11/12/92	29	100,702	3,472	68,889	68.0
SPF4-25	11/12/92	14	66,887	4,777	54,387	81.0
SPFL2-26	11/13/92	17	90,628	5,331	73,387	81.0
SPFL2-27	11/13/92	21	88,850	4,230	53,333	60.0
SPF2-28	11/16/92	33	221,360	6,707	193,671	87.7

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Table 6. Continued.

Lot	Date	No. females	No. eggs	Average fecundity	Eyed eggs	Percent eye-up
REG 6	11/17/92	576	935,326	1,623	497,826	53.2
REG 7	11/17/92	87	299,860	3,446	236,110	78.0
SPF3-29	11/18/92	39	150,237	3,852	130,040	86.5
SPFL2-30	11/19/92	21	90,525	4,310	72,784	80.4
SPF4-31	11/19/92	18	57,029	3,168	47,560	83.3
SPFL2-32	11/20/92	12	40,566	3,380	37,069	91.0
SPF2-33	11/23/92	43	132,979	3,092	121,112	91.0
SPF3-34	11/24/92	13	81,395	6,261	56,395	69.0
SPF4-35	11/24/92	10	43,379	4,337	36,337	83.7
REG 8	11/25/92	97	268,988	2,773	201,502	74.9
REG 9	11/27/92	202	212,001	1,049	194,791	91.9
SPF2-36	12/2/92	25	138,106	5,524	97,481	72.8
REG 10	12/2/92	33	178,933	5,422	152,714	85.3
SPFL2-37	12/4/92	33	119,065	3,608	94,065	79.0
SPFL2-38	12/4/92	31	124,633	4,020	95,846	76.0
SPF3-39	12/8/92	17	124,651	5,419	95,000	76.2
REG 11	12/9/92	27	139,961	5,183	119,230	85.0
SPFL2-40	12/10/92	26	0	SAWTOOTH	0	0.0
SPF4-41	12/11/92	15	76,050	5,070	24,665	32.4
SPFL2-42	12/11/92	16	0	SAWTOOTH	0	0.0
REG 12	12/15/92	32	84,121	2,628	58,823	69.9
REG 13	12/18/92	27	139,961	5,183	119,230	52.0
SPFL3-43	12/23/92	40	217,512	5,437	118,421	54.4
REG 14	12/29/92	20	46,705	2,335	33,333	71.0
SPFL3-44*	12/30/92	12	47,108	3,925	28,837	64.2
SPFL2-45	12/31/92	25	114,515	4,580	100,807	88.0
TOTALS		3,091	9,607,412	3,108	7,189,216	74.8

SPF = Specific Pathogen-Free fish
SPFL = Specific Pathogen-Free fish on light control
SPF2 or SPFL2 = The number signifies the year class of broodstock
SPFL3-44* = The asterisk signifies the eggs were placed in the egg chiller
REG = Earthen pond fish

HSPRTABS

Table 7. Kamloops spawning summary.

Lot	Date	No. females	No. eggs	Average fecundity	Eyed eggs	Percent eye-up
K12	1/10/92	34	92,637	2,724	82,253	88.7
K13	1/17/92	31	67,495	4,830	61,414	90.9
K14	1/24/92	14	41,625	2,973	37,080	89.0
K15	1/31/92	31	79,030	2,549	66,768	84.5
K16	2/7/92	22	56,860	2,217	48,780	85.8
K17	2/14/92	43	100,106	2,328	90,952	90.8
K18	2/21/92	27	75,367	2,791	62,050	82.3
K19	2/28/92	43	117,614	2,735	99,576	84.6
K20	3/14/92	38	119,635	3,148	84,767	70.9
K21	3/26/92	9	26,811	2,979	13,611	50.7
K1	9/11/92	47	216,647	4,610	105,897	48.9
K2	9/16/92	15	64,288	4,286	23,170	36.0
K3	9/28/92	31	130,944	4,224	78,690	60.1
K4	10/7/92	14	57,055	4,075	35,359	62.0
K5	10/13/92	13	48,719	3,748	41,744	88.1
K6	10/20/92	13	55,387	4,261	27,632	49.9
K7	10/27/92	12	40,625	3,385	25,000	61.5
K8	11/3/92	12	54,393	4,533	22,468	41.3
K9	11/10/92	5	22,692	4,538	9,375	52.3
K10	12/21/92	41	0	DISCRD'D	0	0.0
K11	12/28/92	5	22,777	4,554	17,777	78.0
Totals		500	1,490,707	3,248	1,034,363	69.4

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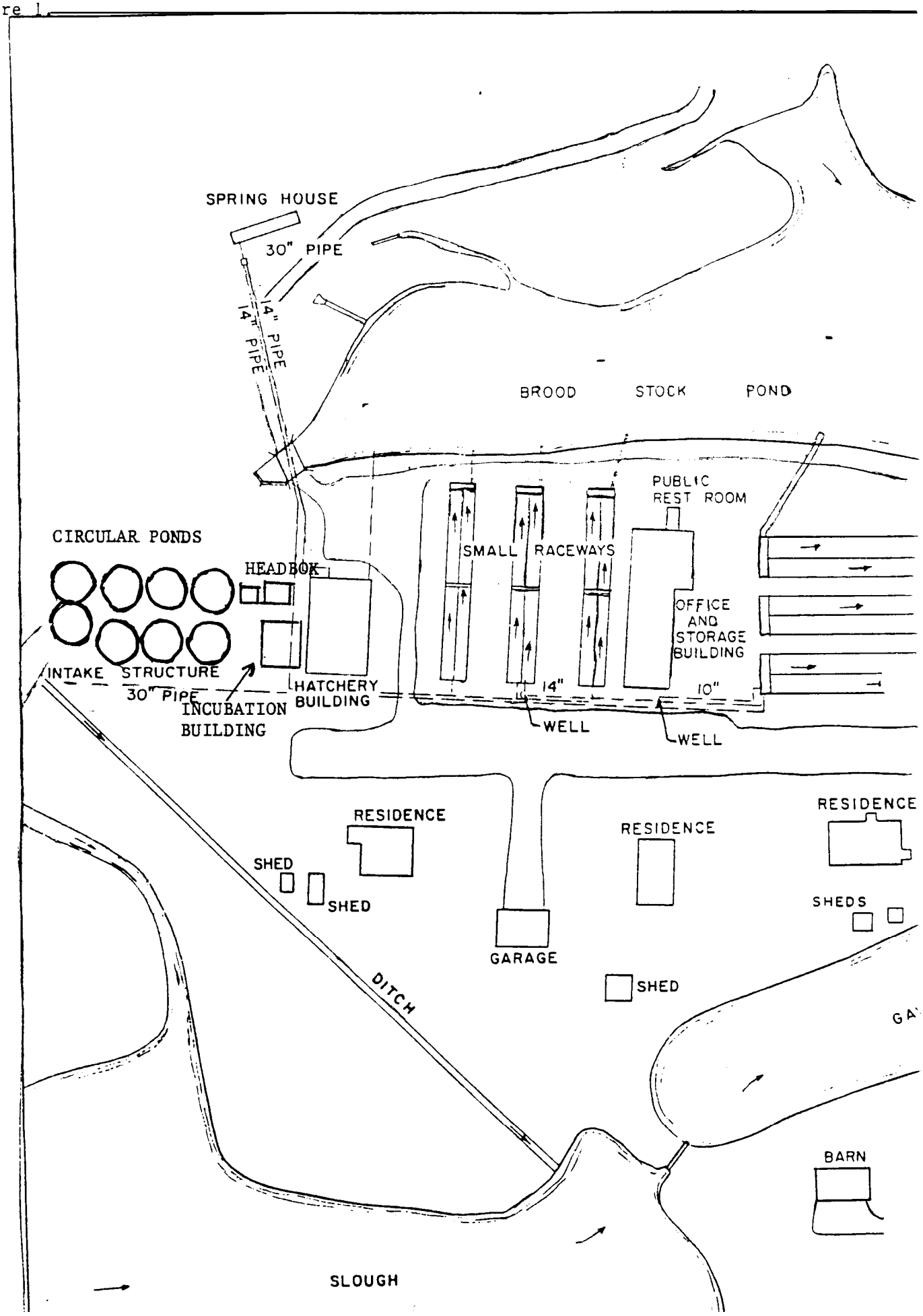
Table 8. Feed fed in the 1992 production year.

Size	Source	Pounds	Cost/ pound	Cost
Swim-up	Rangens	50	0.440	22.00
#1 Granules	Rangens	300	0.440	132.00
#2 Granule	Rangens	550	0.440	242.00
#3 Granule	Rangens	5,100	0.440	2,244.00
#4 Crumble	Rangens	9,100	0.266	2,422.50
#4 Crumble TM	Rangens	1,900	0.506	961.40
3/32" Pellet	Rangens	5,860	0.228	1,297.98
1/8" Pellet	Rangens	15,570	0.230	3,581.10
1/8" Pellet	Rangens	300	0.410	123.00
5.0 mm Pellet low Phos.	Biodiet	6,000	0.270	1,620.00
5/32" Pellet	Rangens	51,440	0.230	11,836.20
1/4" Pellet	Rangens	25,930	0.280	7,269.77
Totals		122,100	$0.260	$31,751.95

HSPRTABS

Figure 1.


SPRING HOUSE
30" PIPE
14" PIPE
14" PIPE
BROOD STOCK POND
PUBLIC REST ROOM
CIRCULAR PONDS
HEADBOX
SMALL RACEWAYS
OFFICE AND STORAGE BUILDING
INTAKE STRUCTURE
30" PIPE
INCUBATION BUILDING
HATCHERY BUILDING
14"
10"
WELL
WELL
RESIDENCE
RESIDENCE
RESIDENCE
SHED
SHED
SHEDS
GARAGE
SHED
DITCH
BARN
SLOUGH

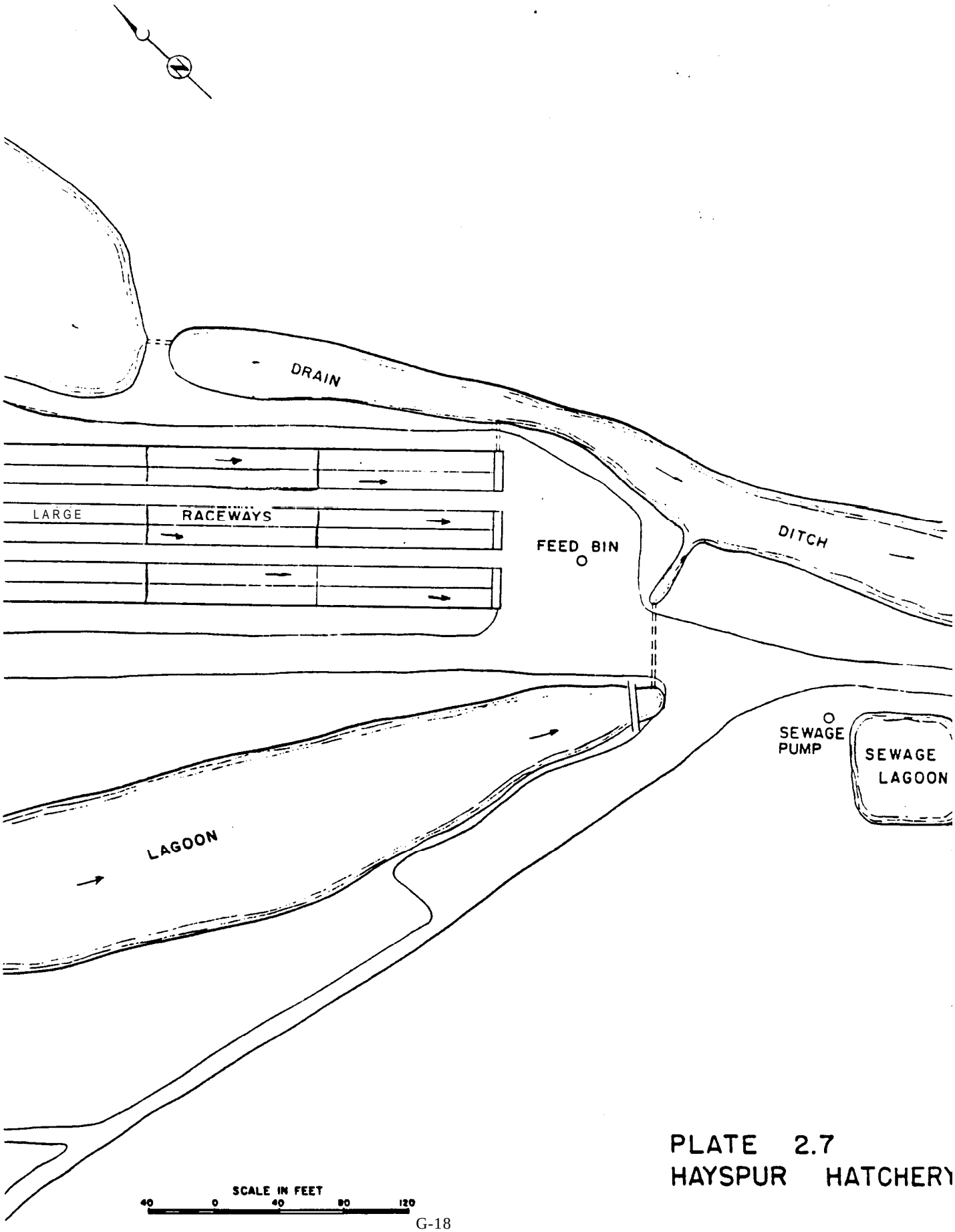
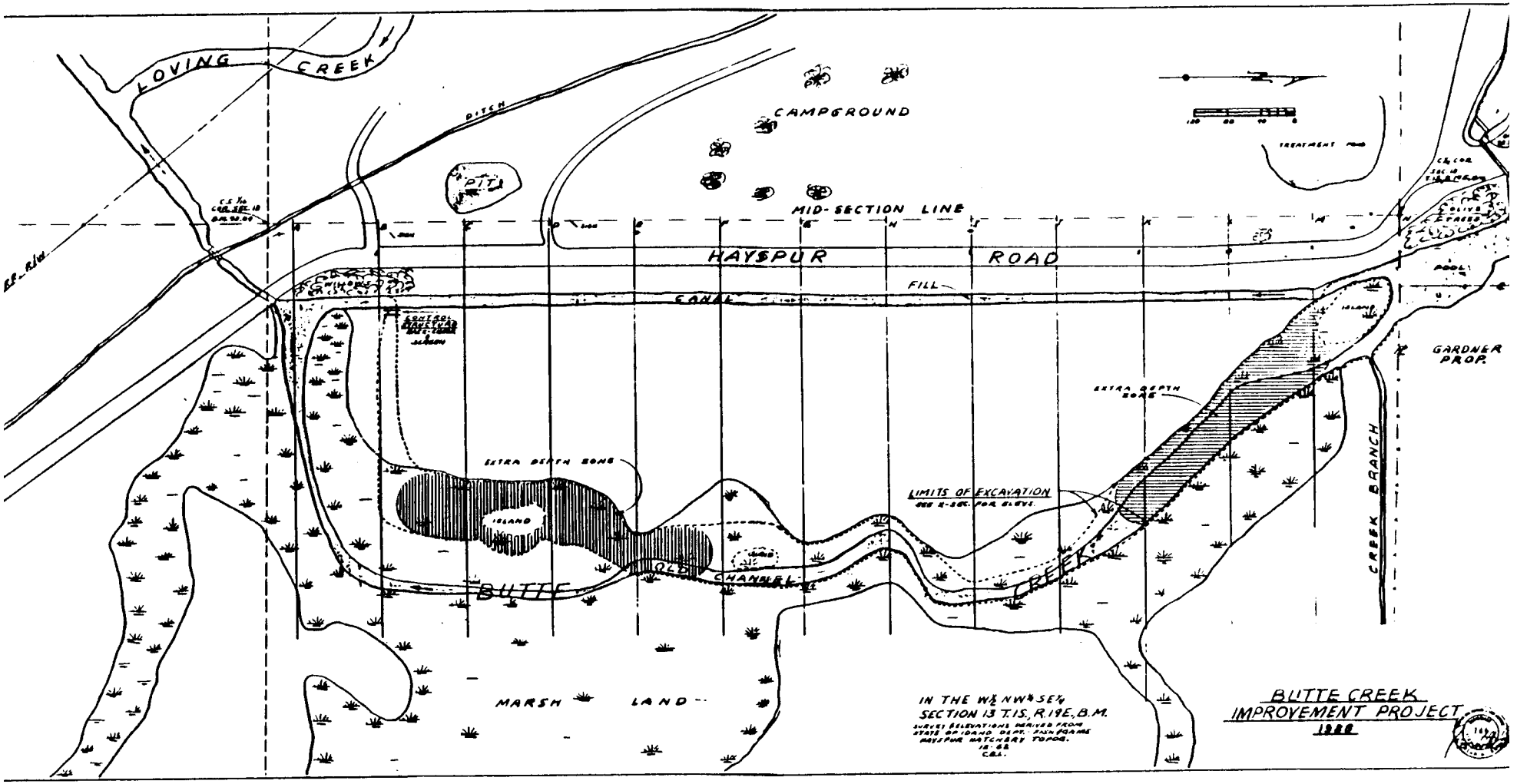


PLATE 2.7
HAYSPUR HATCHERY

Figure 2.


LOVING
CREEK
DITCH
CAMPGROUND
PIT
MID-SECTION LINE
HAYSPUR
ROAD
FILL
CANAL
GARDNER
PROP.
EXTRA DEPTH
DUG
EXTRA DEPTH DUG
LIMITS OF EXCAVATION
ISLAND
OLD CHANNEL
BUTTE
CREEK
CREEK BRANCH
MARSH
LAND
IN THE W½ NW¼ SE¼
SECTION 13 T.1S., R.19E., B.M.
BUTTE CREEK
IMPROVEMENT PROJECT
1988